

WHAT IS CLAIMED IS:

1. A method for verifying that a message received from a user is intelligible, comprising:

- receiving the message from the user;
- measuring a speech level of the user's message;
- determining whether the measured speech level of the message is below a pre-determined speech level threshold;
- measuring a signal-to-noise ratio of the user's message;
- determining whether the measured signal-to-noise ratio of the message is below a pre-determined signal-to-noise ratio threshold;
- calculating an estimate of intelligibility for the user's message;
- determining whether the calculated estimate of intelligibility is below an intelligibility threshold; and
- prompting the user to repeat at least a portion of the message if any of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility of the user's message are determined to be below their respective thresholds.

2. The method of claim 1, further comprising:

- converting the user's message from an analog signal to a digitized signal that represents the user's message.

3. The method of claim 1, further comprising:

- if none of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility are determined to be below their respective thresholds, storing the message.

4. The method of claim 1, further comprising:

- if the measured speech level of the message is below the pre-determined speech level threshold, prompting the user to repeat at least the portion of the message in a higher volume.

5. The method of claim 1, further comprising:

if the calculated estimate of intelligibility is below the intelligibility threshold, prompting the user to repeat at least the portion of the message slowly.

6. The method of claim 1, wherein determining whether the calculated estimate of intelligibility is below the intelligibility threshold comprises:

determining whether any portion of the user's message contains important information;

recognizing the portion of the user's message that contains the important information;

calculating the estimate of intelligibility for the recognized portion of the user's message that contains the important information, wherein the estimate of intelligibility indicates the degree to which the recognized important information is intelligible;

comparing the calculated estimate of intelligibility for the recognized portion of the user's message that contains the important information with the intelligibility threshold; and

if the calculated estimate of intelligibility for the recognized portion of the user's message that contains the important information is below the intelligibility threshold, prompting the user to repeat the portion of the user's message determined to contain the important information.

7. The method of claim 1, wherein determining whether the calculated estimate of intelligibility is below the intelligibility threshold comprises:

identifying phonemes contained in the user's message;

recognizing in the user's message one or more phonemes from a complete set of phonemes that are expected for a particular language, wherein the estimate of intelligibility is calculated based on the recognized one or more phonemes;

comparing the estimate of intelligibility calculated based on the recognized one or more phonemes with the intelligibility threshold; and

if the estimate of intelligibility calculated based on the recognized one or more phonemes is below the intelligibility threshold, prompting the user to repeat at least the portion of the message.

8. The method of claim 7, further comprising:

combining the recognized phonemes into a single text string; and
parsing the single text string into recognizable words.

9. The method of claim 7, further comprising:

if one or more phonemes that are expected for the particular language are not recognized, accessing an extended set of phonemes, wherein the extended set of phonemes includes phonemes that are not found in the particular language;

recognizing in the user's message one or more phonemes from the extended set of phonemes, wherein the estimate of intelligibility is calculated based on the recognized one or more phonemes from the extended set of phonemes;

comparing the estimate of intelligibility calculated based on the recognized one or more phonemes from the extended set of phonemes with the intelligibility threshold; and

if the estimate of intelligibility calculated based on the recognized one or more phonemes from the extended set of phonemes is below the intelligibility threshold, prompting the user to repeat at least the portion of the message.

10. The method of claim 9, further comprising:

analyzing the phoneme distribution based on the recognized one or more phonemes from the extended set of phonemes; and

based on the analyzed phoneme distribution, identifying which language is being spoken by the user.

11. The method of claim 1, wherein determining whether the calculated estimate of intelligibility is below the intelligibility threshold comprises:

determining a domain for the user's message;

accessing a domain library from a plurality of domain libraries corresponding to the determined domain;

calculating what percentage of words in the user's message correlate to words in the accessed domain library;

comparing the calculated percentage of words in the user's message that correlate to words in the accessed domain library with the intelligibility threshold; and

if the calculated percentage of words in the user's message that correlate to words in the accessed domain library is below the intelligibility threshold, prompting the user to repeat at least a portion of the message.

12. The method of claim 11, wherein determining the domain of the user's message comprises:

recognizing the words included in the user's message;

determining which of the plurality of domain libraries contains one or more of the recognized words; and

selecting one or more domain libraries that contain the one or more of the recognized words.

13. The method of claim 11, wherein determining the domain of the user's message comprises:

prompting the user for information relating to the domain of the user's message.

14. The method of claim 1, wherein the user's message is in English.

15. The method of claim 1, wherein the user's message is in a foreign language.

16. The method of claim 1, further comprising:

if any of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility of the user's message are determined to be below their respective thresholds, replaying at least the portion of the message back to the user.

17. Apparatus for verifying that a message received from a user is intelligible, comprising:

a receiver that receives the message from the user;

a speech level monitor that measures a speech level of the user's message and that determines whether the measured speech level of the message is below a pre-determined speech level threshold;

a signal-to-noise ratio monitor that measures a signal-to-noise ratio of the user's message and that determines whether the measured signal-to-noise ratio of the message is below a pre-determined signal-to-noise ratio threshold;

an intelligibility monitor that calculates an estimate of intelligibility for the user's message and that determines whether the calculated estimate of intelligibility is below an intelligibility threshold; and

a dialog manager that prompts the user to repeat at least a portion of the message if any of the measured speech level, measured signal-to-noise ratio, and calculated estimate of intelligibility of the user's message are determined to be below their respective thresholds.

18. The apparatus of claim 17, further comprising:

an analog-to-digital converter that converts the user's message from an analog signal to a digitized signal that represents the user's message.

19. The apparatus of claim 17, further comprising:

an output interface that outputs the message if none of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility are determined to be below their respective thresholds.

20. A machine-readable medium having stored thereon a plurality of executable instructions, the plurality of instructions comprising instructions to:

receive the message from the user;

measure a speech level of the user's message;

determine whether the measured speech level of the message is below a pre-determined speech level threshold;

measure a signal-to-noise ratio of the user's message;
determine whether the measured signal-to-noise ratio of the message is below a pre-determined signal-to-noise ratio threshold;
calculate an estimate of intelligibility for the user's message;
determine whether the calculated estimate of intelligibility is below an intelligibility threshold; and
prompt the user to repeat at least a portion of the message if any of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility of the user's message are determined to be below their respective thresholds.

21. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

convert the user's message from an analog signal to a digitized signal that represents the user's message.

22. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

if none of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility are determined to be below their respective thresholds, store the message.

23. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

if the measured speech level of the message is below the pre-determined speech level threshold, prompt the user to repeat at least the portion of the message in a higher volume.

24. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

if the calculated estimate of intelligibility is below the intelligibility threshold, prompt the user to repeat at least the portion of the message slowly.

25. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

determine whether any portion of the user's message contains important information;

recognize the portion of the user's message that contains the important information;

calculate the estimate of intelligibility for the recognized portion of the user's message that contains the important information, wherein the estimate of intelligibility indicates the degree to which the recognized important information is intelligible;

compare the calculated estimate of intelligibility for the recognized portion of the user's message that contains the important information with the intelligibility threshold; and

if the calculated estimate of intelligibility for the recognized portion of the user's message that contains the important information is below the intelligibility threshold, prompt the user to repeat the portion of the user's message determined to contain the important information.

26. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

identify phonemes contained in the user's message;

recognize in the user's message one or more phonemes from a complete set of phonemes that are expected for a particular language, wherein the estimate of intelligibility is calculated based on the recognized one or more phonemes;

compare the estimate of intelligibility calculated based on the recognized one or more phonemes with the intelligibility threshold; and

if the estimate of intelligibility calculated based on the recognized one or more phonemes is below the intelligibility threshold, prompt the user to repeat at least the portion of the message.

27. The machine-readable medium of claim 26 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

combine the recognized phonemes into a single text string; and
parse the single text string into recognizable words.

28. The machine-readable medium of claim 26 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

if one or more phonemes that are expected for the particular language are not recognized, access an extended set of phonemes, wherein the extended set of phonemes includes phonemes that are not found in the particular language;

recognize in the user's message one or more phonemes from the extended set of phonemes, wherein the estimate of intelligibility is calculated based on the recognized one or more phonemes from the extended set of phonemes;

compare the estimate of intelligibility calculated based on the recognized one or more phonemes from the extended set of phonemes with the intelligibility threshold; and

if the estimate of intelligibility calculated based on the recognized one or more phonemes from the extended set of phonemes is below the intelligibility threshold, prompt the user to repeat at least the portion of the message.

29. The machine-readable medium of claim 28 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

analyze the phoneme distribution based on the recognized one or more phonemes from the extended set of phonemes; and

based on the analyzed phoneme distribution, identify which language the user is speaking.

30. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

determine a domain for the user's message;

access a domain library from a plurality of domain libraries corresponding to the determined domain;

calculate what percentage of words in the user's message correlate to words in the accessed domain library;

compare the calculated percentage of words in the user's message that correlate to words in the accessed domain library with the intelligibility threshold; and

if the calculated percentage of words in the user's message that correlate to words in the accessed domain library is below the intelligibility threshold, prompt the user to repeat at least a portion of the message.

31. The machine-readable medium of claim 30 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

recognize the words included in the user's message;

determine which of the plurality of domain libraries contains one or more of the recognized words; and

select one or more domain libraries that contain the one or more of the recognized words.

32. The machine-readable medium of claim 30 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

prompt the user for information relating to the domain of the user's message.

33. The machine-readable medium of claim 20 having stored thereon additional executable instructions, the additional instructions comprising instructions to:

if any of the measured speech level, measured signal-to-noise ratio and calculated estimate of intelligibility of the user's message are determined to be below their respective thresholds, replay at least the portion of the message back to the user.